NORTH SOUTH UNIVERSITY

Department of Electrical & Computer Engineering

Semester: Summer 2022
Course Initial: CSE332L
Course Title: Computer Organization and Architecture
Faculty: Dr. Mainul Hossain

Project on:

Design a 10-bit Custom RISC-V Microprocessor

Section: 10
Group: 05

Group Members:

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Part 1.1: ISA Design (Document)

We have designed a 10-bit custom RISC-V Microprocessor

1. How many types of instruction (R-Type, I-Type, J-Type, etc.)?
Ans: We have taken two types of instructions. They are - R type and I type.

2. Describe each of the formats (fields and field length)

R type ISA format:
We have taken 4-bit for Opcode and 2-bits for rd, rs and rt type as we need to make 10-bit RISC type of CPU.

OP Code	rd	rs	rt
4-bit	2-bit	2-bit	2-bit

I -type format:
We have taken 4-bit for Opcode and 2-bits for rd, and 4-bit for immediate part.

OP code	rd	Immediate
4-bit	2-bit	4-bit

3. How many operands? (3 operands, 2 operands)
Ans: We have used 3 operands.

4. How many operations?
Ans: We have used 7 operations.

5.Types of operations? (Arithmetic, logical, branch type?? How many from each category? List the opcodes and respective binary values)

Ans: We have used 7 operations. These operations are belonged to arithmetic and logical part. We have also categorized opcodes and their respective binary values. An instruction table is given below:

Instructions Table:

Category	Operation	Format	Example	Meaning	Opcode
Arithmetic	Addition	R-Type	add $r1,$r2	$r2 =$r1+ $r2	0000
	Addition immediate	I-Type	addi $r1, 3	$r1= $r1+2	0001
	Subtraction	R-Type	sub $r1,$r2	$r2= $r1- $r2	0010
	Subtraction immediate		subi $r1, 3	$r1= $r1-2	0011
Logical	AND	R-Type	and $r1,$r2	$r2=$r1.$r2	0100
	OR	R-Type	or $r2, $r3	$r2=$r1.3	0101
	XOR	R-Type	xor$r1, 3	$r2=$r1⊕ $r2	0110